

JC19 Rec'd PCT/PTO 27 FEB 2002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
REQUEST FOR FILING NATIONAL PHASE OF  
PCT APPLICATION UNDER 35 U.S.C. 371 AND 37 CFR 1.494 OR 1.495

To: Hon. Commissioner of Patents  
Washington, D.C. 20231



00909

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)

Atty Dkt: P 290643 /2990516US/HS/kop  
M# /Client Ref.

From: Pillsbury Winthrop LLP, IP Group:

Date: February 27, 2002

This is a **REQUEST** for **FILING** a PCT/USA National Phase Application based on:

1. International Application	2. International Filing Date	3. Earliest Priority Date Claimed
PCT/FI00/00741	1 September 2000	2 September 1999
↑ country code	Day MONTH Year	Day MONTH Year
		(use item 2 if no earlier priority)

4. Measured from the earliest priority date in item 3, this PCT/USA National Phase Application Request is being filed within:

(a) ☐ 20 months from above item 3 date (b) ☒ 30 months from above item 3 date,

(c) Therefore, the due date (unextendable) is March 2, 2002

5. Title of Invention CUSTOMIZING PREPAID SERVICE

6. Inventor(s) ANDRESEN et al.

Applicant herewith submits the following under 35 U.S.C. 371 to effect filing:

7. ☒ Please immediately start national examination procedures (35 U.S.C. 371 (f)).

8. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2)) is transmitted herewith (file if in English but, if in foreign language, file only if not transmitted to PTO by the International Bureau) including:

a. ☒ Request;

b. ☒ Abstract;

c. 11 pgs. Spec. and Claims;

d. 2 sheet(s) Drawing which are ☐ informal ☒ formal of size ☒ A4 ☐ 11"

9. ☒ A copy of the International Application has been transmitted by the International Bureau.

10. A translation of the International Application into English (35 U.S.C. 371(c)(2))

a. ☐ is transmitted herewith including: (1) ☐ Request; (2) ☐ Abstract;

(3) \_\_\_\_\_ pgs. Spec. and Claims;

(4) \_\_\_\_\_ sheet(s) Drawing which are:

☐ informal ☐ formal of size ☐ A4 ☐ 11"

b. ☒ is not required, as the application was filed in English.

c. ☐ is not herewith, but will be filed when required by the forthcoming PTO Missing Requirements Notice per Rule 494(c) if box 4(a) is X'd or Rule 495(c) if box 4(b) is X'd.

d. ☐ Translation verification attached (not required now).

RE: USA National Phase Filing of PCT /FI00/00741

JC19 Rec'd PCT/PTO 27 FEB 2002

11. ☒ Please see the attached Preliminary Amendment
12. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)), i.e., **before 18th month** from first priority date above in item 3, are transmitted herewith (file only if in English) including:
13. ☒ PCT Article 19 claim amendments (if any) have been transmitted by the International Bureau
14. ☐ Translation of the amendments to the claims **under PCT Article 19 (35 U.S.C. 371(c)(3)), i.e., of claim amendments** made before 18th month, **is attached (required by 20th month from the date in item 3 if box 4(a) above is X'd, or 30th month if box 4(b) is X'd, or else amendments will be considered canceled).**
15. **A declaration of the inventor** (35 U.S.C. 371(c)(4))  
a. ☐ is submitted herewith ☐ Original ☐ Facsimile/Copy  
b. ☒ is not herewith, but will be filed when required by the forthcoming PTO Missing Requirements Notice per Rule 494(c) if box 4(a) is X'd or Rule 495(c) if box 4(b) is X'd.
16. **An International Search Report (ISR):**  
a. Was prepared by ☐ European Patent Office ☐ Japanese Patent Office ☒ Other  
b. ☒ has been transmitted by the international Bureau to PTO.  
c. ☒ copy herewith (1 pg(s).) ☒ plus Annex of family members (1 pg(s).).
17. **International Preliminary Examination Report (IPER):**  
a. ☒ has been transmitted (if this letter is filed after 28 months from date in item 3) in English by the International Bureau with Annexes (if any) in original language.  
b. ☐ copy herewith in English.  
c.1 ☐ IPER Annex(es) in original language ("Annexes" are amendments made to claims/spec/drawings during Examination) including attached amended:  
c.2 ☐ Specification/claim pages # \_\_\_ claims # \_\_\_  
Dwg Sheets # \_\_\_  
d. ☐ Translation of Annex(es) to IPER **(required by 30<sup>th</sup> month due date, or else annexed amendments will be considered canceled).**
18. **Information Disclosure Statement** including:  
a. ☒ Attached Form PTO-1449 listing documents  
b. ☒ Attached copies of documents listed on Form PTO-1449  
c. ☒ A concise explanation of relevance of ISR references is given in the ISR.
19. ☐ **Assignment** document and Cover Sheet for recording are attached. Please mail the recorded assignment document back to the person whose signature, name and address appear at the end of this letter.
20. ☐ Copy of Power to IA agent.
21. ☐ **Drawings** (complete only if 8d or 10a(4) not completed): \_\_\_ sheet(s) per set: ☐ 1 set informal; ☐ Formal of size ☐ A4 ☐ 11"
22. Small Entity Status ☒ is **Not** claimed ☐ is claimed (pre-filing confirmation required)
- 22(a) \_\_\_ (No.) Small Entity Statement(s) enclosed (since 9/8/00 Small Entity Statements(s) not essential to make claim)
23. **Priority** is hereby claimed under 35 U.S.C. 119/365 based on the priority claim and the certified copy, both filed in the International Application during the international stage based on the filing in (country) FINLAND of:
- |     | <u>Application No.</u> | <u>Filing Date</u>       |     | <u>Application No.</u> | <u>Filing Date</u> |
|-----|------------------------|--------------------------|-----|------------------------|--------------------|
| (1) | <u>19991873</u>        | <u>September 2, 1999</u> | (2) | _____                  | _____              |
| (3) | _____                  | _____                    | (4) | _____                  | _____              |
| (5) | _____                  | _____                    | (6) | _____                  | _____              |
- a. ☒ See Form PCT/IB/304 sent to US/DO with copy of priority documents. If copy has not been received, please proceed promptly to obtain same from the IB.
- b. ☐ Copy of Form PCT/IB/304 attached.

RE: USA National Phase Filing of PCT/FI00/00741

JC19 Rec'd PCT/PTO 27 FEB 2002

24. Attached:

25 Per Item 17.c.2, **cancel original** pages #\_\_, claims #\_\_, Drawing Sheets #26. **Calculation of the U.S. National Fee (35 U.S.C. 371 (c)(1)) and other fees is as follows:**Based on amended claim(s) per above item(s) ☐ 12, ☐ 14, ☐ 17, ☐ 25 (hilite)

Total Effective Claims	11	minus 20 =	0	x \$18/\$9	=	\$0	966/967
Independent Claims	3	minus 3 =	0	x \$84/\$42	=	\$0	964/965
If any proper (ignore improper) Multiple Dependent claim is present,				add \$280/\$140	+	0	968/969

BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(4)): →→ **BASIC FEE REQUIRED, NOW** →→→→A. If country code letters in item 1 are **not** "US", "BR", "BB", "TT", "MX", "IL", "NZ", "IN" or "ZA"

See item 16 re:

1. Search Report was <u>not</u> prepared by EPO or JPO -----	add \$1,040/\$52		960/961
	0		
2. Search Report was prepared by EPO or JPO -----	add \$890/\$445	+1040	970/971

**SKIP B, C, D AND E UNLESS country code letters in item 1 are "US", "BR", "BB", "TT", "MX", "IL", "NZ", "IN", "ZA", "LC" or "PH"**

→ <input type="checkbox"/> B. If <u>USPTO</u> did not issue <u>both</u> International Search Report (ISR) <u>and</u> (if box 4(b) above is X'd) the International Examination Report (IPER), -----	add \$1,040/\$52	+0	960/961
(X)	0		
(only) → <input type="checkbox"/> C. If <u>USPTO</u> issued ISR but not IPER (or box 4(a) above is X'd), -----	add \$740/\$370	+0	958/959
(one) (of)			
(these) ( 4 ) → <input type="checkbox"/> D. If <u>USPTO</u> issued IPER but IPER Sec. V boxes <u>not all</u> 3 YES, -----	add \$710/\$355	+0	956/957
(boxes)			
→ <input type="checkbox"/> E. If international preliminary examination fee was paid to <u>USPTO</u> and Rules 492(a)(4) and 496(b) <u>satisfied</u> (in IPER Sec. V <u>all</u> 3 boxes <u>must</u> be YES for <u>all</u> claims), --	add \$100/\$50	+0	962/963

SUBTOTAL = \$1040

28. If Assignment box 19 above is X'd, add Assignment Recording fee of ---\$40 +0 (581)

29. If box 15a is X'd, determine whether inventorship on Declaration is different than in international stage. If yes, add (per Rule 497(d)) ---\$130 +0 (098)

30. Attached is a check to cover the ----- **TOTAL FEES** \$1040

Our Deposit Account No. 03-3975

Our Order No. 60258 | 290643

C#

M#



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**CHARGE STATEMENT:** The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 and 492 (missing or insufficient fee only) now or hereafter relative to this application and the resulting Official document under Rule 20, or credit any overpayment, to our Account/Order Nos. shown above for which purpose a duplicate copy of this sheet is attached.

This **CHARGE STATEMENT** does not authorize charge of the issue fee until/unless an issue fee transmittal form is filed

**Pillsbury Winthrop LLP**  
**Intellectual Property Group**

By Atty: Christine H. McCarthyReg. No. 41844

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**NOTE:** File in duplicate with 2 postcard receipts (PAT-103) & attachments.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re National Stage Application of PCT/FI00/00741

ANDRESEN et al.

Group Art Unit: Not Yet Assigned

Appln. No. Not Yet Assigned

Examiner: Not Yet Assigned

Filed: February 27, 2002

FOR: CUSTOMIZING PREPAID SERVICE

\* \* \* \* \*

February 27, 2002

**PRELIMINARY AMENDMENT**

Hon. Commissioner of Patents  
Washington, DC 20231

Sir:

Before beginning examination, kindly amend the above-identified application as follows:

**IN THE SPECIFICATION:**

On the first page, just after the title, please insert the following paragraph:

--This is a National Stage application of International Application No.

PCT/FI00/00741, which was filed on September 1, 2000, which designated the U.S., and was filed in the English language.--

**IN THE CLAIMS:**

Please amend claims 1-11 as follows:

1. (Amended) A method for customizing a prepaid service in a telecommunications system, the method comprising:

maintaining subscriber information on at least one prepaid subscriber;

U.S. National Stage Application of PCT/FI00/00741 ANDRESEN et al., atty. dkt. 290643

defining at least two different profiles, each profile defining at least one attribute for the prepaid service;

associating the subscriber's subscriber information with one profile,

providing the prepaid service to the subscriber as indicated by the attribute defined in the profile associated with the subscriber's information.

2. (Amended) A method as claimed in claim 1, which carries out the associating during subscription provisioning.

3. (Amended) A method as claimed in claim 1, the method further comprising updating subscriber information during recharge as defined in the profile.

4. (Amended) A method as claimed in claim 1, which has the attribute of being a deposit function defining how to calculate the credit during recharge.

5. (Amended) A method as claimed in claim 1, which has the attribute of being an expiry function defining how to calculate the validity time of the prepaid credit.

6. (Amended) A method as claimed in claim 1, which has the attribute of being an expiry state handling function defining how the possibilities of a subscriber are limited over time when no recharge is carried out.

7. (Amended) A telecommunications system offering prepaid subscription services, the system comprising at least one database having subscriber information on at least one prepaid subscriber, wherein

U.S. National Stage Application of PCT/FI00/00741 ANDRESEN et al., atty. dkt. 290643

the system is arranged to maintain at least two different profiles, each profile defining at least one attribute for the prepaid service; to associate the subscriber's subscriber information with one profile; and to provide a prepaid service to the subscriber as indicated by the attribute defined in the associated profile.

8. (Amended) A telecommunications system as claimed in claim 7, wherein the attribute is a deposit function and the system is further arranged to calculate a subscriber's credit according to the deposit function defined in the profile associated with the subscriber's subscriber information.

9. (Amended) A telecommunications system as claimed in claim 7, wherein the attribute is an expiry function and the system is further arranged to calculate a subscriber's credit validity according to the expiry function defined in the profile associated with the subscriber's subscriber information.

10. (Amended) A telecommunications system as claimed in claim 7, wherein the attribute is an expiry handling function and the system is further arranged to limit the possibilities of a subscriber over time according to the expiry handling function defined in the profile associated with the subscriber's subscriber information.

11. (Amended) A network element in a telecommunications system, where subscribers of the system can prepay for their calls by recharging their accounts via vouchers, the element including a database or a connection to a database having subscriber information of prepaid subscribers, wherein

U.S. National Stage Application of PCT/FI00/00741 ANDRESEN et al., atty. dkt. 290643

the network element is arranged to have access to profile definitions, each profile defining at least one attribute for the prepaid service, and to update the subscriber information during recharge according to a profile associated with the recharging subscriber's subscriber information.

Please see the enclosed appendix for changes to the claims.

U.S. National Stage Application of PCT/FI00/00741 ANDRESEN et al., atty. dkt. 290643

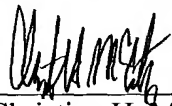
REMARKS

Claims 1-11 are pending in this National Stage application. By this Amendment, these claims are amended to further conform to U.S. practice, *e.g.*, to remove reference numerals and multiple dependencies. No new material is added to the claims.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached Appendix is captioned **"VERSION WITH MARKINGS TO SHOW CHANGES MADE"**.

Respectfully submitted,

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Enclosure: Appendix



**APPENDIX  
VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE SPECIFICATION:**

The priority claim is recited.

**IN THE CLAIMS:**

1. (Amended) A method for customizing a prepaid service in a telecommunications system, the method comprising[ the steps of]:

maintaining subscriber information on at least one prepaid subscriber,

[ c h a r a c t e r i z e d b y ]

defining at least two different profiles, each profile defining at least one attribute for the prepaid service;

associating the subscriber's subscriber information with one profile,

providing the prepaid service to the subscriber as indicated by the attribute defined in the profile associated with the subscriber's information.

2. (Amended) A method as claimed in claim 1, [c h a r a c t e r i z e d b y] which carries [carrying] out the associating during subscription provisioning.

3. (Amended) A method as claimed in claim 1[ or 2], [c h a r a c t e r i z e d b y] the method further comprising[ the step of] updating subscriber information during recharge as defined in the profile.

4. (Amended) A method as claimed in [claims] claim 1,[ 2 or 3,]  
[c h a r a c t e r i z e d b y] which has the attribute of being a deposit function defining how to calculate the credit during recharge.

U.S. National Stage Application of PCT/F100/00741 ANDRESEN et al., atty. dkt. 290643

5. (Amended) A method as claimed in [claims] claim 1,[ 2 or 3,]  
[c h a r a c t e r i z e d by] which has the attribute of being an expiry function defining how to  
calculate the validity time of the prepaid credit.

6. (Amended) A method as claimed in [claims] claim 1,[ 2 or 3,]  
[c h a r a c t e r i z e d by] which has the attribute of being an expiry state handling function  
defining how the possibilities of a subscriber are limited over time when no recharge is  
carried out.

7. (Amended) A telecommunications system [(S)] offering prepaid subscription  
services, the system comprising at least one database [(SMP)] having subscriber information  
on at least one prepaid subscriber, [c h a r a c t e r i z e d in that] wherein

the system [(S)] is arranged to maintain at least two different profiles, each profile  
defining at least one attribute for the prepaid service; to associate the subscriber's subscriber  
information with one profile; and to provide a prepaid service to the subscriber as indicated  
by the attribute defined in the associated profile.

8. (Amended) A telecommunications system [(S)] as claimed in claim 7,  
[c h a r a c t e r i z e d in that] wherein the attribute is a deposit function and the system [(S)]  
is further arranged to calculate a subscriber's credit according to the deposit function defined  
in the profile associated with the subscriber's subscriber information.

9. (Amended) A telecommunications system [(S)] as claimed in claim 7,  
[c h a r a c t e r i z e d in that] wherein the attribute is an expiry function and the system [(S)]

is further arranged to calculate a subscriber's credit validity according to the expiry function defined in the profile associated with the subscriber's subscriber information.

10. (Amended) A telecommunications system [(S)] as claimed in claim 7, [c h a r a c t e r i z e d in that] wherein the attribute is an expiry handling function and the system [(S)] is further arranged to limit the possibilities of a subscriber over time according to the expiry handling function defined in the profile associated with the subscriber's subscriber information.

11. (Amended) A network element [(IP)] in a telecommunications system, where subscribers of the system can prepay for their calls by recharging their accounts via vouchers, the element including a database or a connection to a database [(SMP)] having subscriber information of prepaid subscribers,

[c h a r a c t e r i z e d in that] wherein

the network element [(IP)] is arranged to have access to profile definitions, each profile defining at least one attribute for the prepaid service, and to update the subscriber information during recharge according to a profile associated with the recharging subscriber's subscriber information.

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JC19 Rec'd PCT/PTO 27 FEB 2002

## **Customizing prepaid service**

### **Background of the invention**

**[0001]** The present invention relates to a method and equipment for customizing prepaid service.

**[0002]** In telecommunications systems, such as the pan-European digital mobile communications system GSM (Global System for Mobile Communications), the use of prepaid SIM (Subscriber Identity Module) cards is increasing. Prepaid SIM cards relieve the network service providers of credit losses. They enable parents to set an upper limit for the telephone bill beforehand. As a third benefit, they enable roaming subscribers to pay their local calls with local tariffs, whereas the use of a SIM card of their home service provider results in paying international tariffs to their home network and back.

**[0003]** Usually service providers allow the subscribers to call an Interactive Voice Response (IVR) service through which the service subscribers can check their account balance and add more money to their accounts. This money adding is called recharge. Instead of calling the IVR it is possible to also call to the operator's service number. It is also possible to check the account balance and recharge via the SMAP, which is an Internet-based user interface. Recharge is carried out by means of vouchers. Some service providers sell different types of vouchers, which differ from each other e.g. in the number of call units and expiry time.

**[0004]** One problem with the current prepaid solution is that the attributes of the prepaid service are the same to all subscribers - or at least to all subscribers using the same kinds of vouchers since the attributes are connected with the voucher. So the operators are not able to offer a customized prepaid service. One example of a prepaid service attribute is how the prepaid subscription data is updated during recharge.

### **Disclosure of the invention**

**[0005]** The object of the invention is to overcome the above problem. The object of the invention is achieved with a method, a system and a network element which are characterized in that what disclosed in the independent claims. The preferred embodiments of the invention are set forth in the dependent claims.

U.S. National Stage Application of PCT/FI00/00741 ANDRESEN et al., atty. dkt. 290643

**[0006]** The invention is based on defining different subscriber profiles having different attributes and associating subscriber information with an indication of which profile to use with this subscriber.

**[0007]** The advantages of the invention are that the service providers can customize their prepaid service without changing the basic service structure by giving different profiles to the subscribers. Thus customizing and changing customized services are very easy.

**[0008]** In one embodiment of the invention the attribute is a deposit function. A further advantage of this embodiment is that other features than the voucher value may also be taken into account when calculating a new credit.

**[0009]** In still another embodiment of the invention the attribute is an expiry function. The further advantage of this embodiment is that other features than the voucher validity time may also be taken into account when calculating new expiry dates.

#### **Brief description of the figures**

**[0010]** The invention will be described in further detail in the following by means of preferred embodiments with reference to the accompanying drawings, in which

**[0011]** Figure 1 is a block diagram showing some relevant network elements;

**[0012]** Figure 2 is a block diagram illustrating different profiles according to a first preferred embodiment;

**[0013]** Figure 3 is a flow chart illustrating subscriber provisioning; and

**[0014]** Figure 4 is a flow chart illustrating the functionality of the invention during recharge.

#### **Detailed description of the invention**

**[0015]** Figure 1 is a block diagram of a telecommunications system S equipped with an arrangement according to a preferred embodiment of the invention. The telecommunications network is assumed to be a public land mobile network PLMN yet without limiting the invention to that kind of particular network. The invention can be used in any telecommunications systems, where prepaid subscribers have subscription information stored in the system.

U.S. National Stage Application of PCT/FI00/00741 ANDRESEN et al., atty. dkt. 290643

A prepaid subscriber refers here to a subscriber using prepaid subscription, i.e. a subscriber who has paid in advance. The embodiment illustrated in Figure 1 makes use of Intelligent Network technology. An intelligent network IN is able to provide a subscriber of a telecommunications network, such as a wired network or a mobile telephone network, with a plurality of services. An example of such an intelligent network is described in recommendations of the ITU-T Q-1200 series, of which Q-1210 to Q-1219 define a set of features known as CS-1 (Capability Set 1), and correspondingly, Q-1220 to Q-1229 define a set of features CS-2. The invention and its background will be described by the terminology of recommendation ETS 300 374-1 CoreINAP, but the invention can also be employed in intelligent networks implemented according to other intelligent network standards.

**[0016]** Figure 1 shows some elements of an intelligent network which are relevant to the understanding of the invention, such as what are known as intelligent peripherals IP. Usually an IP is associated with a specialized resource function which is an interface for network mechanisms associated with interaction with a subscriber. Therefore an IP comprises usually e.g. more advanced speech handling functions than do exchanges in general. The IVR application is usually located in the IP. The IVR application, also called the PrePaid service IVR application, is an interactive voice response application that allows the subscriber to add money to (deposit, recharge) his PrePaid SIM account by entering the number of a prepaid voucher. The IP is connected to an SSP using for example ISUP (ISDN User Part) signalling and one or more voice transports.

**[0017]** The SSP (Service Switching Point) is a network element performing a service switching function (SSF). The SSP may be a mobile service switching centre MSC, which includes the SSF. The SSF is an interface between a conventional call control function CCF and the service control function SCF of an intelligent network. The network element performing the SCF is called a service control point SCP. An intelligent network service is produced by the service switching point SSP inquiring instructions from the service control point SCP by means of messages to be transmitted across the SSP/SCP interface upon the encounter of detection points associated with the service. In association with an intelligent network service, a service program is started at the service control point SCP, the operation of the program deter-

U.S. National Stage Application of PCT/FI00/00741 ANDRESEN et al., atty. dkt. 290643

mining the messages transmitted by the SCP to the SSP at each stage of a call. However, usually the SCP is not used in the service logic of the Prepaid SIM IVR recharge application, i.e. calls to the IVR are routed by the CCF directly to the IVR on the basis of the service number which the subscriber has dialled in order to recharge.

**[0018]** In the example illustrated in Figure 1, the prepaid subscriber information and information about vouchers are in a database located in a service management point SMP. Alternatively the information may be located in different databases and/or in some other network element, like a home location register HLR. The IVR interfaces the SMP database through a service management interface SMI. The SMP and the IP may be connected e.g. through a local area network (LAN) using the TCP/IP (Transmission Control Protocol/Internet Protocol). The connection between the IP and the SMP, illustrated by a dashed line, represents only management connection without any signalling connection, e.g. functions used to calculate the expiry time or times during recharge.

**[0019]** In a first preferred embodiment of the invention, predefined profiles are located also in the SMP and each subscriber's subscriber information comprises a profile identifier indicating which profile to use. Thus many subscribers can have the same profile but each subscriber has only one profile in the first preferred embodiment. A prepaid profile is a profile defining at least one of the following attributes: deposit function, expiry function, account maximum, maximum validity period and expiry state handling function. The deposit function defines how the new prepaid credit is calculated. The expiry function defines how the validity of the prepaid credit is calculated based e.g. on current validity, recharge amount, voucher used for recharge, etc. In those embodiments where the prepaid expiry handler has different states for progressively limiting the possibilities of the subscriber over time when no recharge is performed, the expiry state handling function may define for each state when the subscriber is in that state. The expiry state handling function may also define how and where to route calls in different situations, e.g. in different states. The expiry handling function or parts of it may also be included in the expiry function.

**[0020]** The expiry handling function may also be included in the expiry function.

**[0021]** The service management access point SMAP provides some selected users, such as service providers and network operators, with access to the service data of the service management point SMP through a public telephone network, such as the PSTN or the ISDN, a cellular radio network (such as the GSM) or a public data network (X.25, the Internet) and an open interface. The SMAP interacts directly with the SMP. Furthermore, the SMAP can provide access to a network element of another telecommunications network, such as the home location register HLR comprising data related to subscriber information and telecommunications services. Functionally, the SMAP comprises a service management access function. The profiles can be defined and definitions changed via the SMAP. The SMAP is described in greater detail in PCT patent application WO98/41038 which is incorporated herein by reference.

**[0022]** Network operators and service providers are nowadays separated. A service provider buys the necessary bearer services from a network operator. A network operator may also be a service provider. An operator may also have multiple service providers.

**[0023]** Figure 2 shows an example of different profiles according to the first preferred embodiment of the invention. In the first preferred embodiment of the invention, prepaid services are built with prepaid expiry having different kinds of time limits. In the first preferred embodiment, the prepaid subscriber who has activated his subscription is in one of the five different subscription states, the states being active, near the credit expiry, credit expired, near subscription expiry and subscription expired. The state depends on how long has passed since the subscriber last time recharged. When the credit expires, the credit of a prepaid account is no longer valid. When the subscription expires, the subscription is no longer valid and the subscription is deactivated. The "near states" are states during which an announcement is given indicating what is going to happen soon if the account is not recharged. The prepaid expiry is described in greater detail in Finnish patent application FI990937 which is incorporated herein by reference.

**[0024]** Referring to Figure 2, a service provider has defined three different profiles: a Gold Profile in which the credit never expires and at each recharge a bonus is given; a Silver profile with a long credit validity and an



U.S. National Stage Application of PCT/FI00/00741 ANDRESEN et al., atty. dkt. 290643

Economy profile where the prepaid credit must be recharged frequently in order not to lose existing credit.

**[0025]** In the first preferred embodiment of the invention, the service attributes to be defined are a deposit function DF and an expiry function EF. In the first embodiment of the invention, it is assumed for the sake of clarity that the same basic function is used in every profile. However, it is possible to define different functions for different profiles. In the first preferred embodiment of the invention, the deposit function is:

**[0026]**  $\text{new credit} = X_n \cdot \text{old credit} + (1 + \text{bonus}) \cdot \text{voucher value}$

**[0027]** where  $X_n$  relates to what state the subscriber is in, e.g.  $X_1$  is used when the subscriber is in the active state,  $X_2$  when the state is "near credit expiry",  $X_3$  in state "credit expired",  $X_4$  "near subscription expiry" and  $X_5$  in state "Subscription expired".

**[0028]** In the first preferred embodiment a max acc, i.e. maximum account credit, is also used. Thus, if a recharge results in a credit greater than the maximum account credit, the recharge is not accepted and the voucher remains unused. In some other embodiments of the invention when the new credit exceeds the max acc, the new credit may also be set for example to the maximum value.

**[0029]** In the first preferred embodiment of the invention, the expiry function calculates the dates as follows:

**[0030]**  $\text{credit expiry date} = A + \text{credit period of a voucher} + T_3$

**[0031]** where  $A$  defines whether to use the current date or the old credit expiry date,  $T_3$  allows adjusting length period before the credit expires. For example in the gold profile illustrated in Figure 2, the credit will expire when the subscription expires.

**[0032]** The other dates are calculated on the basis of credit expiry date in the first preferred embodiment by formula:

**[0033]**  $\text{date} = \text{credit expiry date} + DT_n$

**[0034]** where  $DT_n$  relates to time differences between credit expiry date and other dates.  $DT_2$  is used to calculate the date when the state "near credit expiry" is entered,  $DT_4$  relates to the state "near subscription expiry" and  $DT_5$  "subscription expiry".

**[0035]** In the first preferred embodiment of the invention, a max time, i.e. a maximum validity period, is also used. If a recharge results in the

U.S. National Stage Application of PCT/FI00/00741 ANDRESEN et al., atty. dkt. 290643

number of days between recharge day and the credit expiry date exceeding the maximum validity period, then the new credit expiry date will be set to the current date plus the maximum validity period.

**[0036]** The maximum account credit and the maximum validity period values may be set into the profile definitions as in Figure 2 or the profile definitions may indicate that such attributes are used and the actual values are in the subscriber specific information.

**[0037]** The functions described above in Figure 2 are only examples and meant to illustrate the invention. The service provider may compose different kinds of functions using different kinds of variables, constants, voucher properties, etc.

**[0038]** Figure 3 is a flow chart illustrating subscriber provisioning in the first preferred embodiment of the invention. In step 301 a subscriber number MSISDN is given to a subscriber, and in step 302 a profile is associated with the MSISDN in the subscriber information. The profile is identified with an identifier which can for example be a name like Gold, Silver and Economy in the example illustrated in Figure 2. After that, in the first preferred embodiment of the invention, a subscription expiry date is calculated in step 303 using the value of DT5 of Figure 2 defined in the profile. Then the subscriber information (including the MSISDN, the profile identifier and the subscription expiry date) is stored in step 304 in the SMP and the subscriber can activate his subscription by a recharge.

**[0039]** Figure 4 is a flow chart illustrating a recharge in the first preferred embodiment of the invention. It is assumed, for the sake of clarity, that the new voucher is valid, all necessary information will be obtained and the calling subscriber is a prepaid subscriber, otherwise he cannot recharge. Another assumption, made here, is that the subscriber recharges via the IVR yet without limiting the invention to that particular way to recharge. The invention may be used with other recharge media as well.

**[0040]** Referring to Figure 4, a subscriber has bought a voucher from a shop, called the IVR and selected to deposit the voucher. It is assumed that the IVR checks at the beginning of the call, if the caller is a prepaid subscriber, and if not, then the call is disconnected or connected to customer service. Figure 4 begins in step 401, where the IVR is prompting the subscriber for a voucher identification ID. The voucher identification number ID is

U.S. National Stage Application of PCT/FI00/00741 ANDRESEN et al., atty. dkt. 290643

received in step 402. The validity of the voucher is checked (not shown in Figure 4) and after that, in step 403, the IVR obtains the values of the voucher, e.g. the value to deposit and the credit period used by the deposit function DF and the expiry function EF described in greater detail in Figure 2. The IVR then obtains the subscriber's current credit and profile in step 404. Then the IVR analyzes the profile in step 405 in order to find out what information it needs to update subscriber information. In the first preferred information the necessary information is the current state so that the right value for  $X_n$  can be selected. In step 406 the IVR obtains the necessary information and then the new credit is calculated in step 407 with the deposit function values indicated in the profile. After that the expiry dates are calculated in step 408 with expiry function values indicated in the profile. The updating is then ready and the subscriber is given, in step 409, an audio message telling the new credit and the credit expiry date.

**[0041]** The steps have not been set out in an absolute time sequence in Figures 3 and 4. Some of the above steps may take place simultaneously or in a different order, for example. Some steps may also be skipped, like steps 303 and 408 in embodiments where the expiry is not used. Other steps not shown in figures 3 and 4 may also take place between the steps stated above.

**[0042]** In some other embodiments a default profile may be used. It is automatically associated during provisioning with the subscriber information if no other profile is indicated, or the attributes of the default profile are used during recharge in cases when the subscriber has no profile associated directly with the subscriber information.

**[0043]** It is also possible to add the values of attributes, i.e. profile definitions, to the subscriber information during subscriber provisioning and this way associate the subscriber information with a profile. In these embodiments the subscriber information does not comprise a profile identifier but a whole profile definitions with values for attributes. However, separate profile definitions are more preferable, since they are less laborious and less susceptible to errors. A further advantage of using separate profile definitions instead of adding profile definitions to each subscriber's subscriber information is that a lot less memory is needed and changing profile definitions is much easier.

U.S. National Stage Application of PCT/FI00/00741 ANDRESEN et al., atty. dkt. 290643

**[0044]** The present invention can be implemented in the existing network elements. They all have processors and a memory with which the inventive functionality described above may be implemented. The functions described above may be located in one network element or some of them may be in one element and the others in other elements regardless of how they are located in the examples used to illustrate the invention.

**[0045]** The accompanying drawings and the description pertaining to them are only intended to illustrate the present invention. Different variations and modifications to the invention will be apparent to those skilled in the art, without departing from the scope and spirit of the invention defined in the appended claims.

U.S. National Stage Application of PCT/FI00/00741 ANDRESEN et al., atty. dkt. 290643

## Claims

1. A method for customizing a prepaid service in a telecommunications system, the method comprising the steps of:

maintaining subscriber information on at least one prepaid subscriber,

characterized by

defining at least two different profiles, each profile defining at least one attribute for the prepaid service;

associating the subscriber's subscriber information with one profile, providing the prepaid service to the subscriber as indicated by the attribute defined in the profile associated with the subscriber's information.

2. A method as claimed in claim 1, characterized by carrying out the associating during subscription provisioning.

3. A method as claimed in claim 1 or 2, characterized by the method further comprising the step of updating subscriber information during recharge as defined in the profile.

4. A method as claimed in claims 1, 2 or 3, characterized by the attribute being a deposit function defining how to calculate the credit during recharge.

5. A method as claimed in claims 1, 2 or 3, characterized by the attribute being an expiry function defining how to calculate the validity time of the prepaid credit.

6. A method as claimed in claims 1, 2 or 3, characterized by the attribute being an expiry state handling function defining how the possibilities of a subscriber are limited over time when no recharge is carried out.

7. A telecommunications system (S) offering prepaid subscription services, the system comprising at least one database (SMP) having subscriber information on at least one prepaid subscriber, characterized in that

**U.S. National Stage Application of PCT/FI00/00741 ANDRESEN et al., atty. dkt. 290643**

the system (S) is arranged to maintain at least two different profiles, each profile defining at least one attribute for the prepaid service; to associate the subscriber's subscriber information with one profile; and to provide a prepaid service to the subscriber as indicated by the attribute defined in the associated profile.

8. A telecommunications system (S) as claimed in claim 7, characterized in that the attribute is a deposit function and the system (S) is further arranged to calculate a subscriber's credit according to the deposit function defined in the profile associated with the subscriber's subscriber information.

9. A telecommunications system (S) as claimed in claim 7, characterized in that the attribute is an expiry function and the system (S) is further arranged to calculate a subscriber's credit validity according to the expiry function defined in the profile associated with the subscriber's subscriber information.

10. A telecommunications system (S) as claimed in claim 7, characterized in that the attribute is an expiry handling function and the system (S) is further arranged to limit the possibilities of a subscriber over time according to the expiry handling function defined in the profile associated with the subscriber's subscriber information.

11. A network element (IP) in a telecommunications system, where subscribers of the system can prepay for their calls by recharging their accounts via vouchers, the element including a database or a connection to a database (SMP) having subscriber information of prepaid subscribers,

characterized in that

the network element (IP) is arranged to have access to profile definitions, each profile defining at least one attribute for the prepaid service, and to update the subscriber information during recharge according to a profile associated with the recharging subscriber's subscriber information.

**U.S. National Stage Application of PCT/FI00/00741 ANDRESEN et al., atty. dkt. 290643**

**(57) Abstract**

In order to provide possibility to customize a prepaid service in a telecommunications system, at least two different profiles (Gold, Silver, Economy) are defined, each profile defining at least one attribute (DF, EF) for the prepaid service. A subscriber's subscriber information is associated with one profile and the prepaid service is provided to the subscriber as indicated by the attribute defined in the profile associated with the subscriber's information.

(Figure 2)

1/2

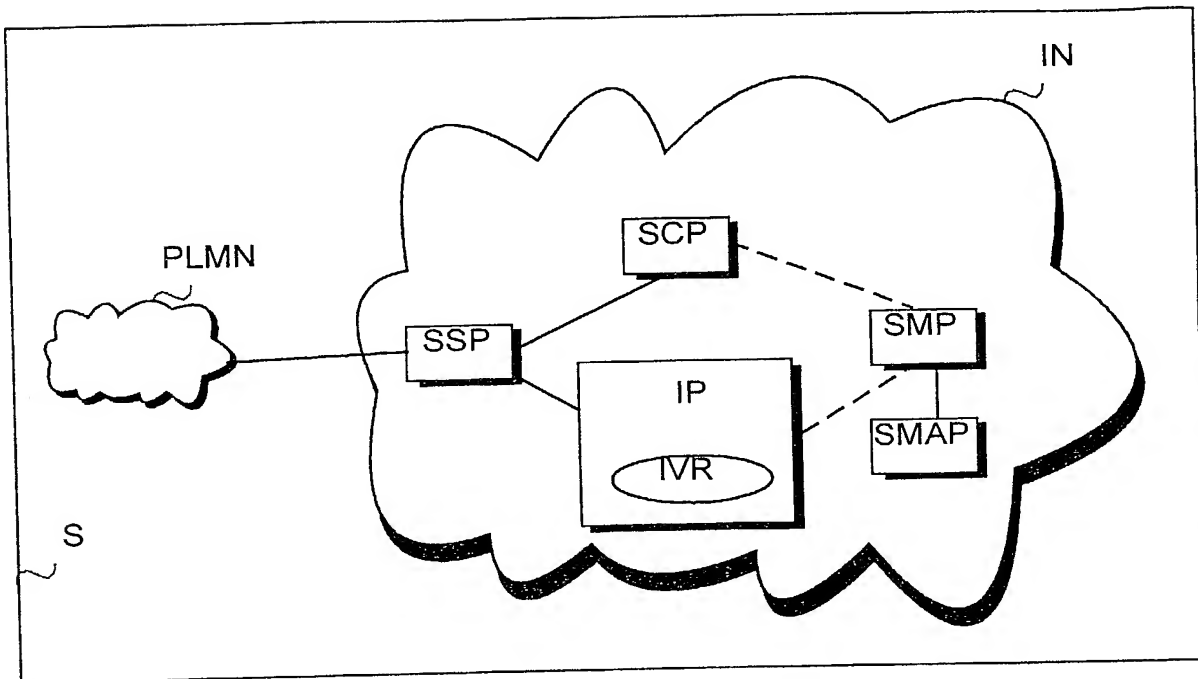


FIG.1

	Gold	Silver	Economy
DF	Bonus	0,1	0
	X1	1	1
	X2	1	0,9
	X3	0,5	0
	X4	0,4	0
	X5	0	0
	Max Acc	None	500
EF	A	Later than old or current	Old
	T3	365	1
	DT2	-335	-30
	DT4	-335	150
	DT5	-365	180
	Max time	None	None
			Current
			0
			-15
			45
			65
			30

FIG.2



2/2

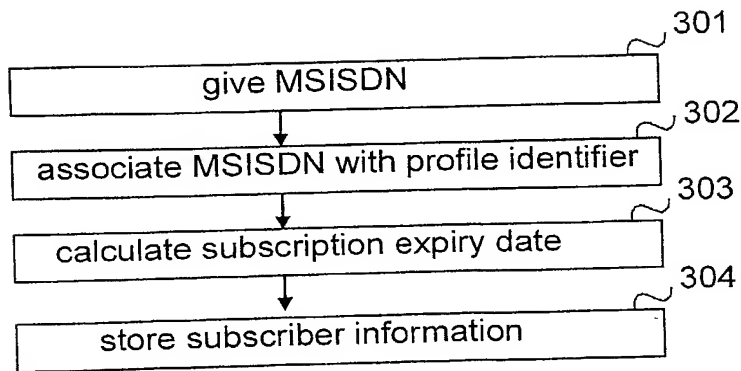


FIG.3

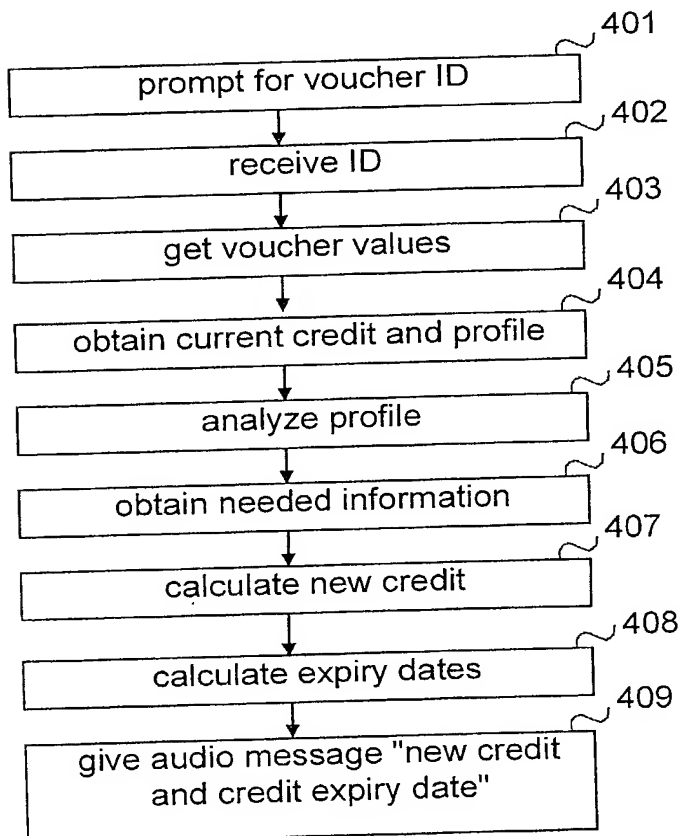


FIG.4

FOR UTILITY/DESIGN  
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DECLARATIONS

RULE 63 (37 C.F.R. 1.63)  
DECLARATION AND POWER OF ATTORNEY  
FOR PATENT APPLICATION  
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

PW  
FORM

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name, and I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the **INVENTION ENTITLED Customizing prepaid service**

the specification of which (CHECK applicable BOX(ES))

X A. ☐ is attached hereto.

BOX(ES) → B. ☐ was filed on \_\_\_\_\_ as U.S. Application No. \_\_\_\_\_ /

→ C. ☒ was filed as PCT International Application No. PCT/ FI00 / 00741 on 1 September 2000

and (if applicable to U.S. or PCT application) was amended on \_\_\_\_\_

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56. Except as noted below, I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International Application which designated at least one other country than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate, or PCT International Application, filed by me or my assignee disclosing the subject matter claimed in this application and having a filing date (1) before that of the application on which priority is claimed, or (2) if no priority claimed, before the filing date of this application.

**PRIOR FOREIGN APPLICATION(S)**

Number	Country	Day/MONTH/Year Filed	Date first Laid-open or Published	Date Patented or Granted	Priority NOT Claimed
19991873	Finland	2 September 1999			

If more prior foreign applications, X box at bottom and continue on attached page.

Except as noted below, I hereby claim domestic priority benefit under 35 U.S.C. 119(e) or 120 and/or 365(c) of the indicated United States applications listed below and PCT international applications listed above or below and, if this is a continuation-in-part (CIP) application, insofar as the subject matter disclosed and claimed in this application is in addition to that disclosed in such prior applications, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56 which became available between the filing date of each such prior application and the national or PCT international filing date of this application:

**PRIOR U.S. PROVISIONAL, NONPROVISIONAL AND/OR PCT APPLICATION(S)**

Application No. (series code/serial no.)	Day/MONTH/Year Filed	Status	Priority NOT Claimed
		pending, abandoned, patented	

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And I hereby appoint Pillsbury Winthrop LLP, Intellectual Property Group, telephone number (202) 861-3000 (to whom all communications are to be directed), and persons of that firm who are associated with USPTO Customer No. 909 (see below label) individually and collectively my attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith and with the resulting patent, and I hereby authorize them to delete from that Customer No. names of persons no longer with their firm, to add new persons of their firm to that Customer No., and to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/ organization who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct the above firm and/or an attorney of that firm in writing to the contrary.

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☐ FOR ADDITIONAL INVENTORS see attached page.

☐ See additional foreign priorities on attached page (incorporated herein by reference).

Atty. Dkt. No. P

(M#)

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FORM

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the specification of which (CHECK applicable BOX(ES))

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BOX(ES) → A. ☐ is attached hereto.  
→ B. ☐ was filed on \_\_\_\_\_ as U.S. Application No. \_\_\_\_\_ /  
→ C. ☒ was filed as PCT International Application No. PCT/ FI00 / 00741 on 1 September 2000  
and (if applicable to U.S. or PCT application) was amended on \_\_\_\_\_

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Application No. (series code/serial no.)	Day/MONTH/Year Filed	Status pending, abandoned, patented	Priority NOT Claimed
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And I hereby appoint Pillsbury Winthrop LLP, Intellectual Property Group, telephone number (202) 861-3000 (to whom all communications are to be directed), and persons of that firm who are associated with USPTO Customer No. 909 (see below label) individually and collectively my attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith and with the resulting patent, and I hereby authorize them to delete from that Customer No. names of persons no longer with their firm, to add new persons of their firm to that Customer No., and to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/ organization who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct the above firm and/or an attorney of that firm in writing to the contrary

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\*00909\*  
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